AWS Security & Ground Station overview

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Agenda

- How AWS Manages Security

- Share Responsibility Model

- AWS Ground Station

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AWS Security

Security is Job Zero – How AWS runs security

Steve Schmidt – Chief Information Security Officer, AWS

AWS has a vastly higher bar for security than most companies

We have a different risk tolerance in AWS than the retail organization does, because if you think about it from the standpoint of the retail organization, they can ship you a new package with the same thing in it at their expense; they can refund your money on your credit card – we can't give you your data back if we lose it…

Full read: https://www.zdnet.com/article/how-amazon-web-services-runs-security-at-a-global-scale

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Security is Job Zero – How AWS runs security

Steve Schmidt – Chief Information Security Officer, AWS

Human beings make mistakes; … I don't like that. I like repeatability and security processes.

So we've invested enormous amounts in repeatable automation for security. The net result is I don't have to have security engineers doing the grunt work all the time. Now there's a whole team to back up if something blows up…

Full read: https://www.zdnet.com/article/how-amazon-web-services-runs-security-at-a-global-scale

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Security is Job Zero – How AWS runs security
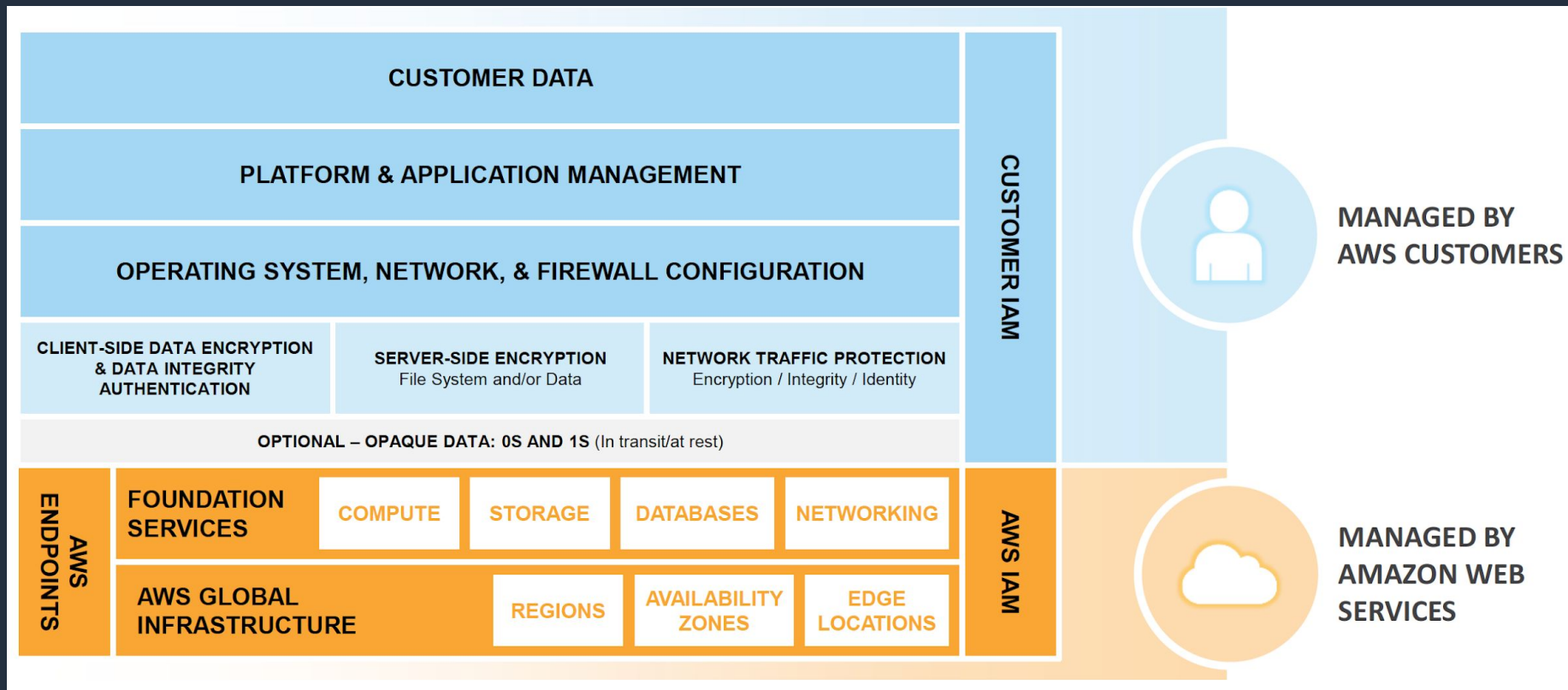
Steve Schmidt – Chief Information Security Officer, AWS

We don't solve all problems. What we do is give you a foundation that you can trust and depend on…

Something I think is critically important is teaching our own staff how to make good judgement calls on things…that's why I don't want the humans in the security operations center doing the grunt work, I want them using that one thing that they have that the machine doesn't which is their judgement

Full read: https://www.zdnet.com/article/how-amazon-web-services-runs-security-at-a-global-scale

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Shared Responsibility: Infrastructure Services

Amazon EC2, Amazon EBS, Amazon VPC

Shared Responsibility: Abstract Services

Such as Amazon S3, Amazon DynamoDB, and Amazon Kinesis

CUSTOMER DATA

CLIENT-SIDE DATA ENCRYPTION
& DATA INTEGRITY AUTHENTICATION

OPTIONAL – OPAQUE DATA: 0S AND 1S
(In flight/at rest)

SERVER SIDE ENCRYPTION PROVIDED BY THE PLATFORM
Protection of data at rest

NETWORK TRAFFIC PROTECTION PROVIDED BY THE PLATFORM
Protection of data in transit

PLATFORM & APPLICATION MANAGEMENT

OPERATING SYSTEM, NETWORK, & FIREWALL CONFIGURATION

AWS IAM

FOUNDATION SERVICES

COMPUTE | STORAGE | DATABASES | NETWORKING

AWS GLOBAL INFRASTRUCTURE

REGIONS | AVAILABILITY ZONES | EDGE LOCATIONS

AWS ENDPOINTS

MANAGED BY AWS CUSTOMERS

MANAGED BY AMAZON WEB SERVICES

AWS security solutions

Identity	Detective control	Infrastructure security	Data protection	Incident response
AWS Identity & Access Management (IAM)	AWS CloudTrail	Amazon EC2 Systems Manager	AWS Key Management Service (KMS)	AWS Config Rules
AWS Organizations	AWS Config	AWS Shield	AWS CloudHSM	AWS Lambda
AWS Cognito	Amazon CloudWatch	AWS Web Application Firewall (WAF)	Amazon Macie	
AWS Directory Service	Amazon GuardDuty	Amazon Inspector	Certificate Manager	
AWS Single Sign-On	VPC Flow Logs	Amazon Virtual Private Cloud (VPC)	Server Side Encryption	

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Service Breadth & Depth

TECHNICAL & BUSINESS SUPPORT
- Support
- Professional Services
- Partner Ecosystem
- Training & Certification
- Solutions Architects
- Account Management
- Security & Pricing Reports

HYBRID ARCHITECTURE
- Integrated Networking
- Direct Connect
- Identity Federation
- Integrated App Deployments
- Data Backups
- Integrated Resource Management

MARKETPLACE
- Business Apps
- Business Intelligence
- DevOps Tools
- Security
- Networking
- Databases
- Storage

ANALYTICS
- Data Warehouse
- BI
- Hadoop/Spark
- Data Analysis
- Data Collection
- Machine Learning
- Elastic Search

APP SERVICES
- Queuing & Notifications
- Workflow
- Search
- Email
- Transcoding

MOBILE SERVICES
- API Gateway
- Identity
- Sync
- Mobile Analytics
- Single Integrated Console
- Push Notifications

DEV & OPS
- One-click Deployment
- DevOps
- Application Lifecycle Management
- Containers
- Triggers
- Resource Templates

IoT
- Rules Engine
- Device Shadows
- Device SDKs
- Device Gateway
- Registry

ENTERPRISE APPS
- Virtual Desktops
- Sharing & Collaboration
- Corporate Email
- Backup

SECURITY & COMPLIANCE
- Identity
- Access Control
- Key mgmt & Storage
- Monitoring & Logs
- Configuration, Compliance
- Firewalls
- Assessment, reporting
- Auditing

CORE SERVICES
- Compute
- Storage
- CDN
- Databases
- Networking

INFRASTRUCTURE
- Regions
- Availability Zones
- Points of Presence

"Based on our experience, I believe that we can be even more secure in the AWS cloud than in our own data centers."

-Tom Soderstrom, CTO, NASA JPL

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AWS Ground Station

Customer Challenges

Government

Higher Education

Businesses

Ground Antennas
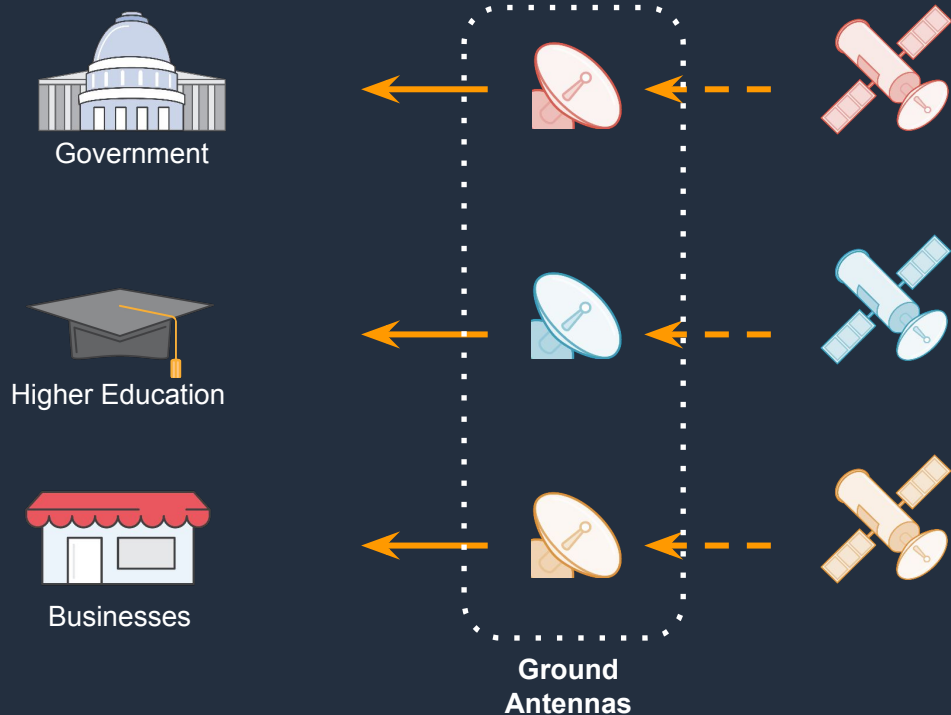
- Are expensive to build.
- Are difficult to maintain.
- Require high CapEx investment to scale.
- Support opaque pricing.
- Cause data access latency.
- Have scheduling conflicts.

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What Customers Want
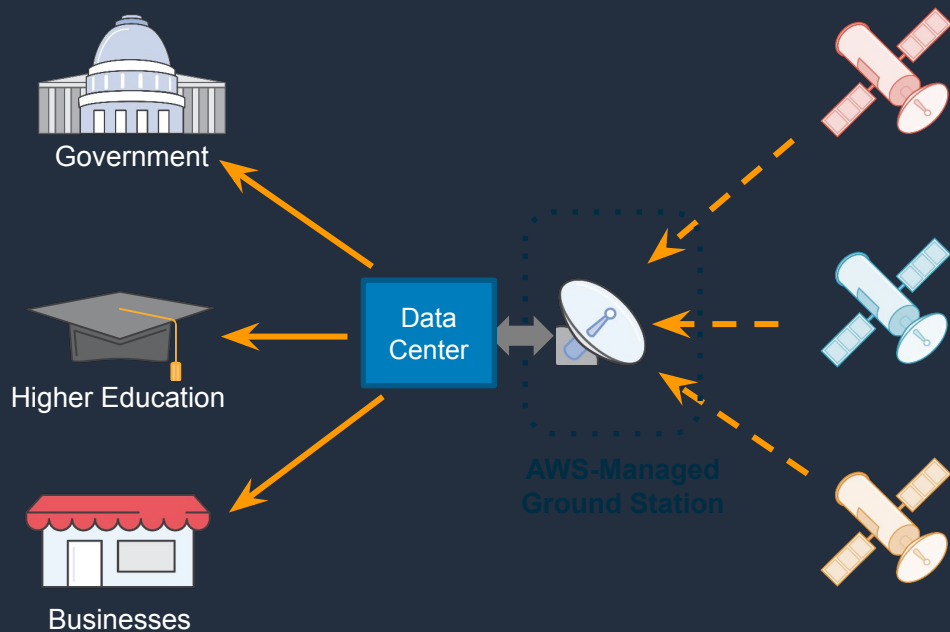
- No infrastructure commitments.

- On-demand scalability.

- Efficient and transparent pricing.

- Minimal data latency.

- Direct access to data processing capabilities.

What AWS Ground Station Offers
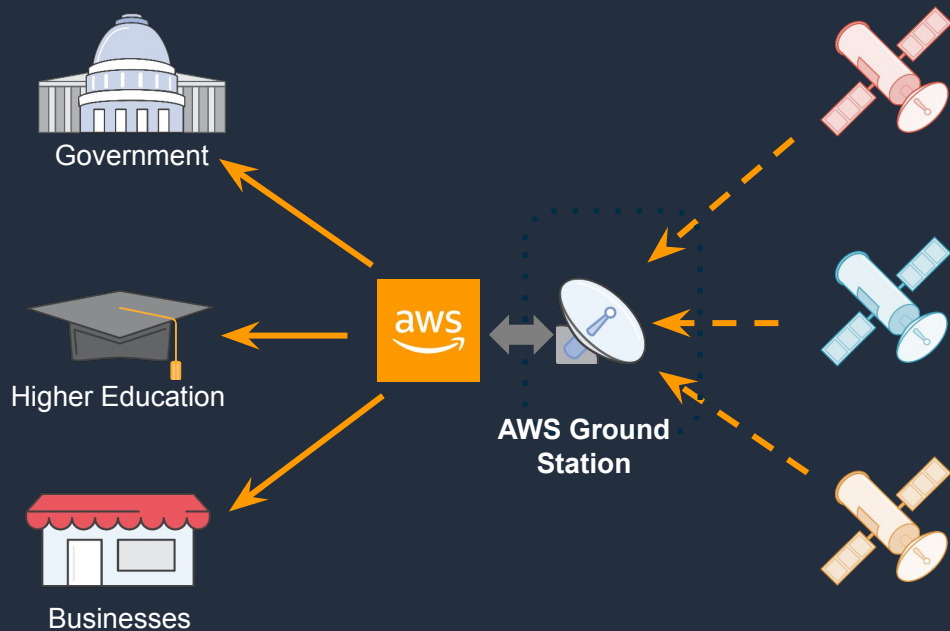
- Satellite ground support with no infrastructure commitments
- Pay by minute pricing
- Self-service scheduling
- Co-located ground stations and AWS data centers providing direct access to AWS resources and services
- Backhaul of base band data to customer region of choice included in pricing

Government

Higher Education

Businesses

AWS Ground Station

Easily control satellites and ingest data with fully managed Ground Station as a Service

Data Security

Security includes protecting and securing the information from the antenna(s), with data encrypted at rest and in transit throughout the AWS Cloud. AWS manages and operates its global network and controls it exclusively.

Physical Security

Fences, ID scans, monitoring, and authentication of employees inside the Ground Stations. Video surveillance, wind/storm protection, physical destruction of facility from accidental or intentional damage, protection from employee theft of data, etc.

Data Backhaul

AWS offers highly reliable, low latency and high throughput network connectivity. This is achieved with a fully redundant 100 Gbps global network. Base band backhaul of your data to AWS region of choice included in pricing at no extra charge.

Per Minute Pricing

Pricing based on time of connectivity rather than amount of data received and transmitted. No contracts or long term commitments.

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AWS Ground Station Architecture

AWS Security and Identity

AWS Ground Station

Antenna System

Onboarding

Orchestration

Propagation & Location sync

Front End Processor

Scheduling

Digitizer / Radio

AWS CONSOLE

Downlink

Uplink

AWS SDK

Customer VPC

ENI

EC2

Software radio / data recovery

Mission data processing

Tracking Telemetry and Control

Analytics

Machine Learning

Storage

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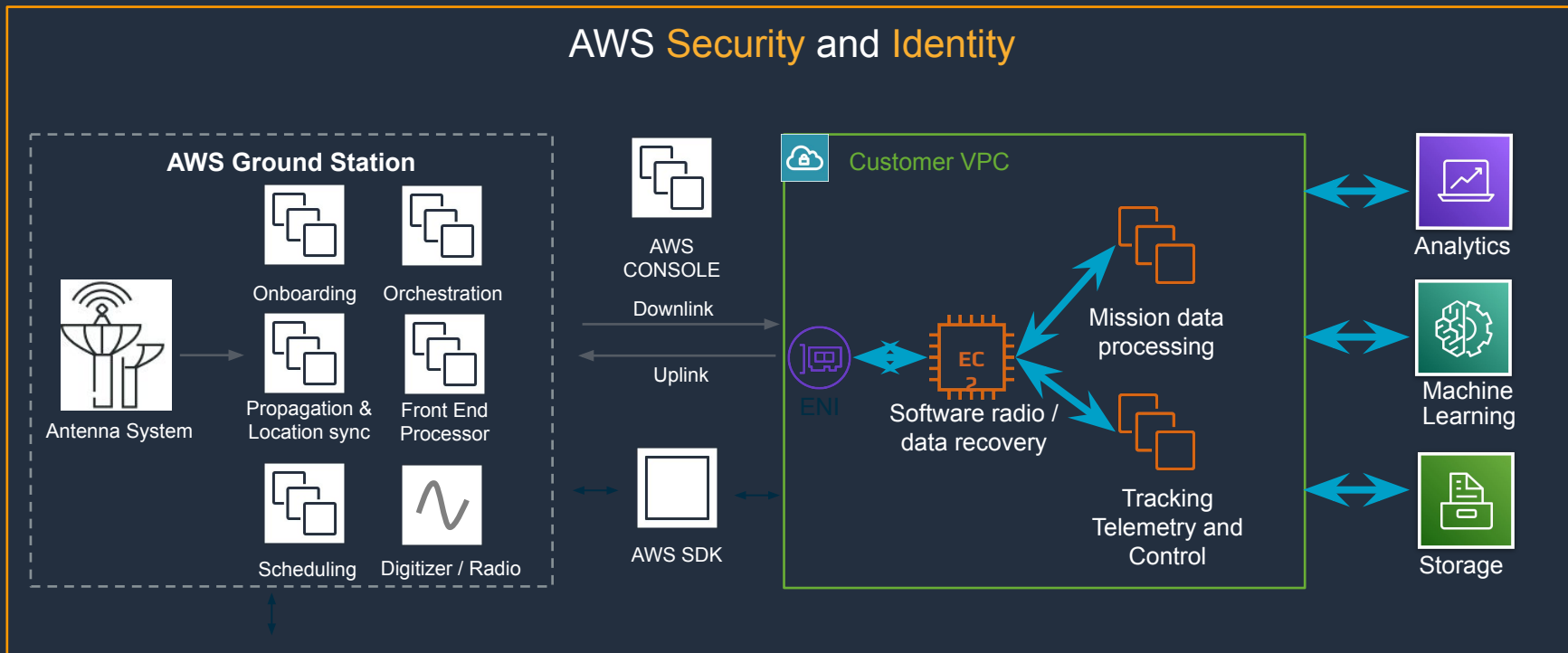
Summary

Leverage a Global Network

Base band backhaul of your data to AWS region of choice included in pricing at no extra charge.

Customers want flexible options

No contracts or long term commitments; schedule passes in reserved or on-demand fashion.

Pay by the minute

Simple, transparent per minute pricing of narrow and wideband options, regardless of size of payload.

Low Latency access to additional AWS products

Add value to data with access to 160+ products including AI/ML, Compute, Storage, & Database.

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Thank-you

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Service Capabilities at Launch

Supported orbits:
   Low Earth Orbit (LEO)
   Medium Earth Orbit (MEO)
   Geostationary Orbit (GEO)

Frequencies supported:
   Simultaneous narrowband S-band, X-band and
   Simultaneous wideband X-band downlink

North America coverage:
   Columbus, OH and Portland, OR

Near term roadmap:
   UHF uplink and downlink
+   10 additional international locations

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Pricing

- Customers pay by-the-minute
- Reserved Minute Contacts may be reserved up to 21 days in advance and rescheduled up to 1 day prior to a scheduled contact.
- Reserved minute pricing is available for customers who reserve a minimum of 150 minutes per month, for 12 months.
- Standard pricing across all regions
- Pricing reflected in USD, more details available here

	Narrowband (≤54MHz)	Wideband (>54 MHz)
On Demand	$10/min	$22/min
Reserved	$3/min	$10/min

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Aperture Details

5.4 Meter Parabolic Dish Tracking Antennas

Gain: 30.5 dB/T X-Band, 16 dB/T

EIRP: 53dBW X-Band, 28.5dB UHF

Link Budget

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Hardware Specifications

AWS Ground Station Specifications Sheet
For the 5.4m Antenna Systems

Tracking	X-Band	S-Band
Orbit	LEO > 250 km, GEO	
Inclinations	All	
Pointing	0.05° rms BRE	
Bands	**X-Band**	**S-Band**
Polarization		
Receive	Simultaneous LHCP & RHCP	Selectable LHCP/RHCP
Transmit	N/A	Selectable LHCP/RHCP
Frequency	**X-Band**	**S-Band**
Receive	7750 to 8400 MHz	2200 to 2300 MHz
Transmit	N/A	2025 to 2120 MHz
G/T	30.5 dB/K	16.0 dB/K
EIRP	N/A	53.0 dBW
Bandwidth	125 kHz to 500 MHz	10 kHz to 54 MHz
Channels	**X-Band**	**S-Band**
Receive	1 per polarization (1x RHCP & 1x LHCP)	1 total (1x RHCP or 1x LHCP)
Transmit	N/A	1 total (1x RHCP or 1x LHCP)
Symbol Rates, Modulation, FEC, and Frame Processing		
Payload	Details available upon request	
TT&C	Details available upon request	
Interfaces	**X-Band**	**S-Band**
Signal IP Data	Digital RF stream in VITA-49.2 (i.e. RF-over-IP)	Digital RF stream in VITA-49.2 (i.e. RF-over-IP)
Uncoded IP Data	Digital RF stream in VITA-49.2 (i.e. Baseband Frames)	N/A

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